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EXTRACTS

FROM A FEW OF

THE MANY HIGHLY EULOGISTIC REVIEWS

THAT HAVE APPEARED OF

"The Stars and the Earth."

From the Border Watch, November 5.

"Our readers, we are confident, will thank us for introducing them to 'The Stars and the Earth.' Perhaps nothing we ever read, of uninspired man's penmanship, has excited within us sensations of a more startling yet pleasurable kind. We know not who the author is, nor under what circumstances the sublime idea, the outline of which he has here so ably sketched, was first suggested to his mind; but this we will say, that a life of scientific research has often borne scantier fruit than is here presented to the world for a shilling; and men have had their names handed down to posterity, as the world's benefactors, who have not given birth to any thing half so valuable as the theory we have just endeavored to explain. We wait with impatience the promised development of the magnificent idea partially opened to us in 'The Stars and the Earth.'"

From the Family Herald.

"This little book contains a new idea, which is saying a great deal in these times of intelligence, when all creation is ransacked by the genii of poetry, philosophy, science, and theology, for something new, striking, and entertaining. It is an idea, too, which is infinitely sublime and beautiful. It is one of the most poetical ideas which the human mind can entertain, — an idea which is not merely chimerical and imaginary, but based on scientific facts, and logically true. We wonder it has never been hit upon before. We have sometimes been very near it, and are only surprised that we never caught it. We give the author full credit for the discovery, and thank him for it.

. . . . . .

"Once more we thank the author for a magnificent poetical idea, too rich ever to be forgotten by a mind that loves the sublime and the beautiful."

From the Cambridge Advertiser.

"To our metaphysical readers — and to all who, as Christians, or even as Natural Theologians, desire to have clearer and more satisfactory views of the mysterious attributes of the Omniscient, and of Time and Space — we cordially recommend this little work."

From the Cambridge Independent Press.

"This is a splendid little work, and cannot be too freely circulated. It is written in a popular style, and with much simplicity; valuable not only to adults, but very instructive to children."

From the Critic.

"Forty-eight small pages, suggesting food for a life of thought."

From the Greenock Advertiser.

"A rare thing, — out of the common path, — and from its very novelty worthy of a little examination."

From the Nottingham Review, October 30.

"A little work, full of bright guesses and lovely imaginings, which will be right welcome to the bold-minded student who dares to grapple with problems the most intricate, and who aspires after that higher knowledge which is found above the region of sense, and can only be even glanced at as the result of a complete and continued abstraction of the soul from all meaner and lower associations. Many of the thoughts are striking in themselves, and will become suggestive of ideas yet more novel in the intelligent reader's mind. We have much pleasure in commending it to the perusal of all persons who are sufficiently blessed with imagination to comprehend subjects which are above the level of commonplace."

From Dolman's Magazine, December, 1846.

"Limited as is the space of this publication, it contains a fund of deep thought which larger works on astronomical subjects have seldom developed. It is most logically written. Step by step, from undeniable premises, does the writer prove his point, until the omniscience of the one great Deity is made apparent to our mental vision, and in an extraordinary new and clearer light."

THE STARS AND THE EARTH;

OR,

THOUGHTS UPON

SPACE, TIME, AND ETERNITY.

Fr. Isaac Reed.

From the Third English Edition.

From the german
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RECOMMENDATORY LETTER

FROM THE REV. THOMAS HILL.

WALTHAM, July 24, 1849.

Messrs. Crosby & Nichols.

Many thanks, my dear Sirs, for the copy of "THE STARS AND THE EARTH," a little book which I had not before seen, but with which I have been highly delighted. It does resemble, in the nature of its topics, the *concluding* chapters of my own "Geometry and Faith," to which you allude, and which is publishing by C. S. Francis, of New York; but the author has selected quite a different example for illustration, and developed with much more minuteness and fulness the leadings of his idea. I need not say how cordially I should welcome a reprint of "The Stars and the Earth;" if for no other reason, for this, that it is pleasant to have fellow-laborers in any good work.

The identity of religion and philosophy, proclaimed by Erigena in the ninth century, is daily becoming more evident. In all departments of human thought, the deepest thinkers are striving more earnestly after laws; that is, after expressions of the thoughts of God. The object of science is defined by one of the most distinguished of its students to be, to unfold the harmony of creation; that is, to unfold the wisdom and unity of the Creator; and in proportion to the clearness with which the end of science is perceived, will higher attainments be made in it. No real advancement of any of the sciences can then henceforward be made, but by men of devout and reverent spirit. The state of human knowledge, proposed by Comte as the aim of science, when all facts shall be included in one formula or law, must be accompanied by a state of human faith which shall see this law to be a single thought of the wisdom of God, prompted by his love and expressed by his will. To this end, all results of every science are leading. Not only is "the connection of the physical sciences" becoming more manifest, showing one Mind to have created heaven and earth, but the connection between history and geography; geology and the life of man; logic, mathematics,

taste, and faith; daily revealing itself, reveals also that one Mind as an infinitely kind Father of men.

This little book, "The Stars and the Earth," takes up, in its first part, the phenomenon of light, and from it shows, with great clearness, how the past may be actually present to God, and become hereafter actually present to men. As Babbage, in his "Ninth Bridgewater Treatise," demonstrates that the shores of the ocean shall, through eternity, re-echo the shriek of the drowning slave, whom his *Christian* captor may have thrown overboard to lighten the ship when hard pressed by pursuing police-boats of the nations, so does this unknown author show that we need only be present at a sufficient distance to have at this instant the testimony of eyesight to the monstrous guilt.

In the second part, the author endeavors to show the unity of the Creator, by showing the unity of the creation; and to show the unity of the creation, by showing that it may be the embodiment of a single thought, and occupy neither Space nor Time, — these being only modes of human perception. In this last point, we think he fails; but the failure is of no consequence; for it is enough to have shown that the universe

may be the embodiment of a single thought. The equation of a geometric curve is one formula, one thought, whether fulfilled by a curve drawn in the skies or on an atom. But in his ingenious attempts to show that Space and Time are capable of indefinite contraction, therefore of annihilation, without the destruction of phenomena manifested in them, he suggests thoughts of the relation of Space and Time to Eternity and Omnipresence, which are surpassed only perhaps by those suggested in Prof. Lovering's paper in the "Cambridge Miscellany."

The circulation of this book would be, I am convinced, of benefit both to science and religion. To religion, by showing, so far as it goes, that science leads to faith. To science, by pointing out to younger students the true spirit in which she should be wooed; still more, by presenting her in a lovely and attractive garb to the notice of men. It is a book of sublime poetry; and it will be a happier day for all men, when they have learned that as poesy signifies creation, so is the creation poesy; and science causes the heart of its faithful student to sing a perpetual hymn of praise and joy.

Yours truly,

THOMAS HILL.

THE STARS AND THE EARTH.

It is a well-known proposition, that a luminous body arising at a certain distance from an observer cannot be perceived in the very same instant of time in which it becomes luminous, but that a period of time, although infinitely short, exists whilst the light, our only medium of vision, passes through the space between the object and our eyes.

The rate at which the light travels is so exceedingly rapid, that it certainly has never been observed, nor have any attempts to measure it been made in the insignificant distances at which objects upon the earth are visible to us. But since we see bodies at

a distance immeasurably greater than the compass of terrestrial dimensions (namely, in viewing the stars above), the most acute calculations and observations have enabled astronomers to measure the speed of light, and to find that it travels at a rate of about two hundred and thirteen thousand miles in a second.

This number is not quite accurate; but, as we now only propose to lay down a general idea, for which the close reckoning of astronomical calculation is not necessary, we will content ourselves here, and in the following pages, with adducing a general average number.

Thus light travels two hundred and thirteen thousand miles in a second; and, as the moon is two hundred and forty thousand miles distant, it follows that, when the first narrow streak of the crescent moon rises above the dark horizon, nearly a second and a quarter elapses before we see it; for the

light takes this time to pass from the moon to our eyes. The moon, therefore, rises above the horizon a second and a quarter before it becomes visible to us.*

The sun, ninety-five millions of miles distant, four hundred times further than the moon, requires a period four hundred times longer than the moon (*i. e.* four hundred times five quarters of a second) to send its light upon our earth. Hence, when the sun rises, *i. e.* when the first ray from the outermost edge of the sun's disk reaches above the horizon, about eight minutes elapse before it passes into our eyes. The sun has, therefore, already risen eight minutes before it becomes visible to us.

The distance of the planet Jupiter from our earth, at the time when it is the greatest, is nearly six hundred and seventeen millions of miles. This is six times and a half as great as the distance of the sun, and there-

* We take no notice of the refraction of the light.

fore the light requires fifty-two minutes to penetrate from Jupiter to us. Lastly, Uranus runs his solitary course at a distance of eighteen hundred millions of miles from us: his light requires, therefore, twenty times as long a period to travel to us as that of the sun, *i.e.* more than two hours; so that Uranus has really risen two hours, when we first perceive him.

No planet has hitherto been discovered more distant than Uranus; but an infinite space exists beyond, separating our sun and its system of planets from the nearest fixed stars.

The distance of the fixed stars from our earth was, until a very recent time, when the measurements of Struve and Bessel were crowned with such glittering results, a deep, inscrutable secret; but now we know that the nearest fixed star, namely, the brightest star in the constellation of Centaur, is about eighteen billions of miles

distant. Its rays of light, therefore, penetrate to us in about three years; that is, the ray of light which meets our eye from this star was not developed and emitted at the same moment but three years ago.

Struve has calculated, with respect to the well-known bright star Vega, in the constellation of the Lyre, that its light consumes twelve years and one month in reaching the earth; and, according to the measurements of Harding and the inquiries of recent astronomers, the following numbers have been deduced as the average distance of the fixed stars from us.

A ray of light requires before it reaches the earth, from a star of the

1st	magnitude . . .	3 to 12 years
2d	,, . . .	20 years.
3d	,, . . .	30 ,,
4th	,, . . .	45 ,,
5th	,, . . .	66 ,,
6th	,, . . .	96 ,,
7th	,, . . .	180 ,,

Moreover, Struve, from the dimensions of his telescope, and from the observation of the fact that a star of the twelfth magnitude, seen through it, has as much light as a star of the sixth magnitude seen with the naked eye, concludes that the distance of a star of the twelfth magnitude is forty-one times greater than that of one of the sixth magnitude; and, consequently, that the smallest of these stars visible to him is at a distance of twenty-three thousand billions of miles, and requires a period of time for the travelling of the light to the earth, as great as four thousand years. That is, the ray of light from a star of the twelfth magnitude, which we may mention is only perceptible by means of a very good telescope, has, at the time it meets our eyes, already left the star four thousand years, and since that time has wandered on in its own course, unconnected with its origin.

We have hitherto confined our considera-

tions to our system of fixed stars; and we will not at present overstep this limit, although it would be easy, were we to enter into hypotheses, to multiply indefinitely these enormous proportions hitherto adduced.

According to a conjecture first made by the great Herschel, and afterwards further developed and rendered intelligible by Mädler, this entire system of fixed stars, forms, if we may use the expression, a single lens-shaped canopy. That is, we, with our sun, are situated nearly in the middle of a space, having the form of two watch-glasses, placed with the concave surfaces towards each other. The surfaces of this canopy are studded tolerably equally with fixed stars. But as we are a thousand times nearer those situated above and below than those at the edges of this hollow lens, so the distances between the stars immediately above us seem greater, whilst the legions of those distributed at the edge are seen in

densely crowded masses. We may consider the Milky Way as the edge and furthermost limit of this set of fixed stars, where the infinitely distant crowds of stars are collected in such masses, that their light flows together into a whitish cloud, and no longer permits us to isolate one star from another.

Beyond *this our lens*, Herschel and the most recent astronomers imagine, that the spots of clouds which appear like oval flakes in the sky are other entirely distinct and independent systems, which float at such an immeasurable distance from us, that the light has to wander millions of years in reaching to us.

It is, however, as we before remarked, sufficient for our purpose to take into consideration only the stars of the twelfth magnitude, from which the light can travel to us in four thousand years. From what we have already said, viz. that the ray of light meeting our eye is not sent forth from the

star at the same moment, but arrives here according to the corresponding and requisite number of seconds, minutes, or years, it follows that we do not see the star as it is, but as it was at the time when the ray of light was emitted.

Thus we see the star in Centaur as it was three years ago, Vega as it was twelve years and one month ago, and so on to the star of the twelfth magnitude, which we look upon as it shone four thousand years ago. Hence follows the conclusion which has frequently been made by astronomers, and which in its result has become popular, viz. that a star of the twelfth magnitude may have been extinguished or set four thousand years ago, whilst we, nevertheless, continue to see its light shining.

This conclusion, when applied to each of the former positions, gives the following results.

We do not see the moon as it is, but as it

was a second and a quarter before; *i.e.* the moon may already have been dispersed into atoms for more than a second, and we should still see it entire and perfect.

We do not see the sun as it now is, but as it was eight minutes before; Jupiter as it was fifty-two minutes; Uranus as it was more than two hours before; the star in Centaur as it was three years ago; Vega as it was nine and a quarter years; and a star of the twelfth magnitude as it was four thousand years ago.

These propositions are well known, and have already been published in popular works upon astronomy.

It is really marvellous that nobody has thought of reversing them, and of drawing the very remarkable and astonishing conclusions which pour upon us in a full stream from the converse; and it is our intention here to examine the converse and the inferences which may thence be drawn.

The following is the relative view of the matter. As we have before remarked, we see the disk of the moon, not in the form in which it now is, but as it was five quarters of a second before the time of observation.

In exactly the same way, an imaginary observer in the moon would not see the earth as it was at the moment of observation, but as it was five quarters of a second before. An observer from the sun sees the earth as it was eight minutes before. From Uranus the time between the reality and the perception by the eye being two hours and a half apart; if, for example, the summit of the Alps on a certain morning was illumined by the first ray of the sun at six o'clock, an observer in this planet, who was provided either with the requisite power of vision, or a sufficiently good telescope, would see this indication of the rising of the sun at half-past eight of our time.

An observer in Centaur can, of course,

never see the Northern hemisphere of the earth, because this constellation never rises above our horizon. But supposing it possible, and that an observer were standing in this star with such powerful vision as to be able to distinguish all particulars upon our little earth shining, but feebly luminous in its borrowed light, he would see, in the year 1843, the public illuminations which, in the year 1840, made the cities of our native country shine with the brightness of day during the darkness of night. An observer in Vega would see what happened with us twelve years ago; and so on, until an inhabitant of a star of the twelfth magnitude, if we imagine him with unlimited power of vision contemplating the earth, sees it as it was four thousand years ago, when Memphis was founded, and the patriarch Abraham wandered upon its surface.

In the immeasurably great number of fixed stars which are scattered about in the

universe, floating in ether at a distance of between fifteen and twenty billions of miles from us, reckoning backwards any given number of years, doubtless a star could be found which sees the past epochs of our earth as if existing now, or so nearly corresponding to the time, that the observer need wait no long time to see its condition at the required moment.

Let us here stop for a moment to make one of the inferences to be drawn from these propositions, which we have laid down, and which are so clear and evident to every reasonable mind.

We have here a perfectly intelligible perception of the idea of the omniscience of God with relation to past events. If we imagine the Deity as a man with human powers, but in a far superior degree, it will be easy for us to attribute to Him the faculty

and power of really overlooking and discerning, even in the most minute particulars, every thing which may be sensibly and actually overlooked and seen from a real point of observation.

Thus, if we wish to comprehend how any past earthly deed or occurrence, even after thousands of years, is as distinctly and immediately in God's presence as if it were actually taking place before His eyes, it is sufficient for our purpose to imagine Him present at a certain point, at which the light and the reflection of the circumstance is just arriving.

Supposing that this result is established; Omniscience, with respect to the past, becomes identical and *one and the same thing* with actual Omnipresence with regard to space. For if we imagine the eye of God present at every point of space, the whole course of the history of the world appears to Him immediately and at once.

That which occurred on earth, eight minutes before, is glancing brightly and evidently in His sight in the sun. Upon the star of the twelfth magnitude, occurrences which have passed away for four thousand years are seen by Him; and in the intermediate points of space are the pictures of the events which have happened in every moment since.

Thus we have here the extension of Time, which corresponds with that of Space, brought so near to our sensible perception; that time and space cannot be considered as at all different from one another. For those things which are consecutive one to the other in point of time, lie next to one another in space. The effect does not follow after the cause, but it exists visibly in space near it, and a picture has spread itself out before us, embracing space and time together, and representing both so entirely and at once, that we are no longer able to

separate or distinguish the extension of space from that of time.

The omniscience of God, with regard to the past, is become intelligible and easy to us, as a sensible and material all-surveying view. Before His eyes, endured with immeasurable powers of sight, the picture of past thousands of years is, at the present moment, actually extended in space.

Hence, when we imagine the purely human sense of sight rendered more extended and acute, we are able actually to comprehend one of the attributes of the Deity.

But, according to the reverse, the excellence of this human sense becomes clear to us, if we have by this time understood that it only requires an increased optical and mechanical intensity of it, to communicate, at least by approximation, a divine power, viz. omniscience with regard to the past, to beings endowed with such exalted powers of vision.

Having drawn this clear and intelligible inference from the previous considerations, let us take a step further in advance. But, since from this point the ideas of *Possibility* and *Impossibility* must be frequently referred to, it is necessary that we and our readers mutually understand each other on this subject.

We call that *possible* which does not contradict the laws of thought; we call that *impossible* which contradicts these laws.

Hence, every ultimate accomplishment of a human discovery is *possible*. But it is impossible to reach the limit which can only be attained on such suppositions as are themselves impossible according to the foregoing definition.

For example, it is possible to pass through any given definite space in any fixed and definite period of time. For as with a steam-carriage we can travel a geographical

mile in ten minutes, and with the electric telegraph can ring a bell at a distance of ten miles in a second, so the supposition that we may be enabled to move from one place to another with speed far surpassing the rapidity of light, rests upon possibility.

We repeat that practically and experimentally such a result will never be arrived at, and require simply that the following be allowed.

If we show that something which hitherto existed only in a dream, or in the imagination of the enthusiastic, can appear attainable and real; but has only such impediments as arise from inability to render perfect certain known mechanical powers, and to move from one place to another with sufficient rapidity; I say that, when we have shown this, the question is transferred from the jurisdiction of dreams and enthusiasm to the jurisdiction of that species of possibility which does not contradict the laws of

thought. For example: the question whether there is such a bird as the phœnix, belongs to the dominion of dreams and folly. But, I say, if, supposing it were possible for us to prove that this bird actually were living in the centre of the earth, or below the depths of the ocean; and if this evidence were perfectly accurate, lucid, and irrefutable, then indeed it would still be impossible for us to see this bird with our bodily eyes; but now that the impediments which oppose the realization of the sight are clearly and intelligibly demonstrated, we may proceed to our purpose of contriving mechanical means to overcome them in the present instance.

Thus, a question hitherto only referable to the region of ideas, dreams, and enthusiasm, being brought to such a point that the impediments against its resolution are simply mechanical and relative to space, is placed quite in another and much nearer

district; viz. under the dominion of what we above designated as possible. We must not here forget, that this possibility is not to be mistaken for experimental practicability, and not to be looked upon in reference to its execution being attained at any time; but it simply bears upon the question, inasmuch as ideas which are, as it were, overcome and won out of the region of empty thought into *this* district of possibility, are now brought nearer to our immediate perception (be it well observed, *perception*, and not *practicability*), and are thus raised out of mere cloudy and feverish fancies into intelligible ideas.

I now continue in the supposition, that I have hitherto made myself perfectly understood by the reader; that the idea of possibility which I have laid down has as little to do with dreams, as it has on the other side with the question of practicability. With this idea we may maintain that it is

possible, *i.e.* not in contradiction to the laws of thought, that a man may travel to a star in a given time; and that he may effect this, provided with so powerful a telescope as to be able to overcome every given distance, and every light and shadow in the object to be examined. With this supposition, and with the aid of a knowledge of the position and distance of every given fixed star (to be attained by the study of astronomy), it will be possible to recall sensibly to our very eyes an actual and true representation of every moment of history that has passed. If, for instance, we wish to see Luther before the council at Worms, we must transport ourselves in a second to a fixed star, from which the light requires about three hundred years (or so much more or less) in order to reach the earth. Thence the earth will appear in the same state, and with the same persons moving upon it, as it actually was at the time of the Reformation.

To the view of an observer from another fixed star, our Saviour appears now upon earth performing his miracles and ascending into heaven; and thus every moment which has passed during the lapse of centuries down to the present time may be actually recalled so as to be present.

Thus the universe encloses the pictures of the past, like an indestructible and incorruptible record containing the purest and clearest truth. And as sound propagates itself in the air, wave after wave; and the stroke of the bell, or the roar of the cannon, is heard only by those who stand nearest, in the same moment when the clapper strikes the bell, or the powder explodes; but each more distant spectator remarks a still greater interval between the light and the sound, until the human ear is no longer able to perceive the sound on account of the distance; or, to take a still clearer example, as thunder and lightning are in reality si-

multaneous, but in the storm the distant thunder follows at the interval of some minutes after the flash; so, in like manner, according to our ideas, the pictures of every occurrence propagate themselves into the distant ether, upon the wings of the ray of light; and although they become weaker and smaller, yet in immeasurable distance they still have color and form; and as every thing possessing color and form is visible, so must these pictures also be said to be visible, however impossible it may be for the human eye to perceive it with the hitherto discovered optical apparatus. It is, besides, for the same reasons, the greatest rashness to wish to determine beforehand the limits beyond which the perfection of our optical instruments may never step. Who could have guessed at the wonderful results which have been discovered by means of Herschel's telescope and Ehrenberg's microscope? We do not, however, require its

practicability, nor even any indication that it is to be hoped for, since we have before explained to the reader the idea which we intend to convey under the word *possible;* and we wish only to move in the regions of possibility of this kind.

Thus, that record which spreads itself out further and further in the universe, by the vibration of the light, really and actually exists and is visible, but to eyes more powerful than those of man.

The pictures of all secret deeds, which have ever been transacted, remain indissolubly and indelibly for ever, reaching from one sun beyond another. Not only upon the floor of the chamber is the blood-spot of murder indelibly fixed, but the deed glances further and further into the spacious heaven.

At this moment is seen, in one of the stars, the image of the cradle from which Casper Hauser was taken to be enclosed in

a living tomb for so many years: in another star glances the flash of the shot which killed Charles XII. But what need is there to refer to individual instances? It would be easy to carry it out to the smallest details; but we leave this to the fancy of the reader, and only request that he will not scorn these images as childish, until he has gone through, with us, the very serious and important inferences which we will now proceed to make.

Let us imagine an observer, with infinite powers of vision, in a star of the twelfth magnitude. He would see the earth at this moment as it existed at the time of Abraham. Let us, moreover, imagine him moved forwards in the direction of our earth, with such speed that in a short time (say in an hour) he comes to within the distance of a hundred millions of miles, being then as

near to us as the sun is, whence the earth is seen as it was eight minutes before; let us imagine all this, quite apart from any claims of possibility or reality, and then we have indubitably the following result, — that before the eye of this observer the entire history of the world, from the time of Abraham to the present day, passes by in the space of an hour. For, when the motion commenced, he viewed the earth as it was four thousand years ago; at the half-way, *i.e.* after half an hour, as it was two thousand years ago; after three quarters of an hour, as it was one thousand years ago; and after an hour, as it now is.

We want no further proof, and it is evident, beyond the possibility of contradiction, that if an observer were able to comprehend with his eye the whirling procession of these consecutive images, he would have lived through the entire history of the world, with all the events and transactions which

have happened in the hemisphere of the globe, turned towards him, in a single hour. If we divide the hour into four thousand parts, so that about a second corresponds to each, he has seen the events of a whole year in a single second. They have passed before him with all the particulars, all the motions and positions of the persons occupied, with the entire changing scenery, and he has lived through them all, — every thing entire and unshortened, but only in the quickest succession, — and one hour was for him crowded with quite as many events as the space of four thousand years upon earth. If we give the observer power also to halt at pleasure in his path, as he is flying through the ether, he will be able to represent to himself, as rapidly as he pleases, that moment in the world's history which he wishes to observe at leisure; provided he remains at a distance when this moment of history appears to have just arrived; al-

lowing for the time which the light consumes in travelling to the position of the observer.

Here again we leave to the fancy of the poet the prosecution of further details, and come to the conclusions which we intend to make.

As we imagined an observer from a star of the twelfth magnitude capable of approaching the earth in an hour, we will now once more suppose that he can fly through the space in a second; or, like the electro-magnetic power, in an immeasurable short time.

He would now live through the period of four thousand years with all their events completely, and as exactly in a moment of time as he did before in the space of an hour.

The human mind, it is true, grows giddy at the thought of such a consecutive train of images and events; but we can easily attribute to a higher or the highest spirit the

power of distinguishing and comprehending with accuracy every individual wave in this astonishing stream.

Hence, the notion, that the Deity makes use of no measurement of time, is become clear and intelligible to us.

When it is written, "Before God a thousand years are as one day," it is a mere empty word, unless the idea is rendered perceptible to our senses. But when, as we have done, *by sensible and actual suppositions*, we are enabled to show that it is possible for a being simply endowed with a higher degree of human power to live through the history of four thousand years in a second, we think we have materially contributed to render intelligible the philosophical statement, that time is nothing existing for itself, but only the form and repository, without which we cannot imagine its contents, viz. the series of consecutive events.

If time was something *real and actually existing, and necessary to the occurrence of events*, it would be impossible for that to take place in a shorter time which occurs in a longer time. But here we see the entire contents of four thousand years concentrated into one second, and not mutilated or isolated, but every event completely surrounded with all its individual particulars and collateral circumstances. The duration of time is, therefore, unnecessary for the occurrence of events. Beginning and end may coalesce, and still enclose every thing intermediate.

Having thus laid our contemplations before the reader, we will express a hope that the images may appear as poetical and sublime to him as to us, and that an hitherto unknown clearness and insight has been

given to his ideas of the omniscience, omnipresence, and eternity of God.

In conclusion, we must acknowledge a slight deception practised on the reader, of which we have rendered ourselves guilty with a quiet conscience. For the images of human and earthly events are not carried forward into the universe upon the wings of the light in so complete a manner and without any exception as we have represented. For example, what takes place within the houses cannot be seen, because the roofs and walls impede the passage of rays, &c.

Nevertheless, as we have frequently and expressly declared, we do not treat of a corporeal view, but of one indicated by possibility in the sense in which we have explained it, and we therefore considered it conducive to the interest of these beautiful and poetical ideas to defer this correction until the end.

We leave the further execution of the details, as we before remarked, to the poet. We hope, however, soon to lay before the public, in continuation of these pages, a development of the new and penetrating ideas which have crowded upon us in such abundance, as the result of the foregoing considerations.

THE STARS AND THE EARTH.

PART SECOND.

PREFACE.

The Author hopes that the appearance of this Second Part of his reflections upon Space, Time, and Eternity, will be received with as much indulgence as the First. In place of supplying the reader with conclusions, he has here rather to stimulate him to more distant and independent considerations.

Eternal Truth, says the proverb, lies at the bottom of a well; but it works and strains to rise upwards to the light. Frequently have the bubbles which have escaped from the fermentation underneath been mistaken for the lost treasure; and frequently, too, have we greeted their appearance with precipitate joy, as a manifestation of Truth itself. But even if we have been deceived, this sign of life and movement in the Spiritual World deserves to be welcomed by us; and on these grounds the following considerations may be taken as an indication, though perhaps a slight one, that Truth lies at the bottom.

THE STARS AND THE EARTH.

It has been shown, in the First Part, how the reflection of earthly events is borne further and further upon the wings of a ray of light into the universe, so that the transactions which took place here thousands of years ago are to-day visible in a distant fixed star; for every thing that has form and color, however weak the light, and however small its proportions, must be considered to be visible. Our theory has been allowed up to this point; viz. that an observer endowed with infinite powers of vision, who in an immeasurably short time has passed from a fixed star of the twelfth

magnitude to the vicinity of the earth, must have seen completely, in this short space of time, the reflection of every thing which has passed during four thousand years upon the surface of the hemisphere directed towards him.

From these positions we deduced consequences which have the effect of rendering the ideas of Space, Time, and Eternity, generally and easily intelligible.

The present little work is intended still further to illustrate these ideas in the same way, and to deliver to the public, in a comprehensible form, those truths and ideas which have hitherto been the exclusive property of professed philosophers; a service with which the reader should be so much the more pleased, since the author of these lines is very far from being willing to reckon himself among the number of these philosophers.

As the former treatise has already made

our readers well acquainted with the plan of the argument, and the mode of demonstration which we employ, so much ceremony and so many details will not be necessary in the following considerations as were found to be so in the former part: a friendly amount of attention alone will enable us to go through together the following points, which are thus briefly enunciated.

Let us come to the question.

Exactly in the same way in which an infinitely quick passage from a fixed star to the earth crowds together the images of all earthly events into a single moment, so, by reversing the process, the succession of these pictures may, in the following way, be indefinitely deferred. Let us suppose that the light, and with it the reflection of some earthly occurrence, arrives at a fixed star of the second magnitude in about twenty years. Let us also suppose, that the observer mounts to this star in the space of

twenty years and one day, starting at the moment when, for example, the blossom of a flower was beginning to unfold itself: he will there find the image of this flower in that stage of development in which it was one day after the commencement of its blooming. If he was endowed with infinite powers of sight and observation, and had been able to follow the development of the blossom throughout his entire journey, he would have had time and opportunity of studying for twenty years the changes which occurred to the flower upon earth in a single day. The successive changes in its form are, as it were, fixed before his eyes. As it is scarcely possible to catch with the eye a butterfly which flits past us, so as to detect the coloring of its wings; and, on the contrary, if we could follow and observe it in its flight, we might count out and separate even the minute grains of colored dust upon its wings; so would the observer, who had

the power of following the reflection of a transitory event upon the wings of the light, be enabled to distinguish the most sudden changes with the greatest accuracy and leisure.

In this way we have, to a certain extent, a *Microscope for time;* for as the magnifying glass apparently enlarges a thousand times the space which a minute object occupies, and thus renders it possible to separate the small contiguous portions of which it consists, which appear to the naked eye as collected into a single point, so he who is able to follow the reflected images of the stages of a rapid development with the speed of a ray of light will be enabled to discover an endless number of separate transactions, of the existence of which we had no previous notion.

A flash of lightning, for example, appears as a momentary light, which blinds us for a time, without permitting us any

power of distinguishing the causes which produce it.

But if we could follow the image of such a flash, only up to the sun, *i. e.* for eight minutes, we should be able to unfold secrets respecting the nature of the phenomenon, which would not be less astounding of their kind than the living worlds which the microscope exposes to our view in a drop of water.

Moreover, if, as we have remarked, the revolutions of our earth, at the time of the Deluge, are at the present time reflected upon a star of the twelfth magnitude, as we should see (if we were provided with infinite visual powers) the events which took place upon the star, not as they are to-day, but as they were thousands of years ago; so an inhabitant of that star, mounting away with the images and rays of light, would be able to solve, by his own personal inspection, all the problems of Geology and the Creation,

concerning which our inquirers into natural history are to this day puzzling themselves. And this reflection does not refer to our earth alone, but the inhabitant of each star sees the past occurrences of other stars; and the events, not only of *our* world, but of *all* worlds, are at present expanded in space as the greatest and truest History of the Universe.

It was laid down and inculcated as strongly as possible in the First Part of this work, that, in these considerations, we only treat of such things *as can be imagined to be possible*, and that we avoid altogether any claims towards reality or practicability. To bring, however, our ideas one step nearer to those who cannot altogether resign their notions of probability, we will make the following remark: The fact that more distant objects appear to us smaller and with less distinct outlines and colors than those which are near, depends in the first place upon the

formation of the human eye, and secondly upon the opacity of the atmosphere.

The rays of sight diverge from the eye, so that a very small body close to it fills up the interval between two such rays; whilst, at a greater distance, a much larger body is necessary to fill up the proportionately increased space between them. If we hold up a shilling at arm's length before our eyes, we may completely conceal the sun with it. If, on the contrary, an organ of vision was constructed in such a manner that the rays proceeded in parallel lines, every object would appear in proportion to every other, and of its own proper size, without any reference to the distance between it and the eye. We certainly should not see distant bodies *entire*, but only such small portions of them as are proportionate to the size of the organ of vision, constructed after this vision; but this little portion would be visible with equal clearness at every distance, and a blade of

grass upon the most distant fixed star could not escape our sight, provided our atmosphere was clear, and freed from all disturbing influences.

By the supposition of an organ of vision of such a construction as this, which assuredly no one will consider impossible to be imagined, it is hoped that the possibility of all that we have brought forward is rendered much more intelligible to many readers.

It would, nevertheless, be but fruitless trouble to spin out the thread of these thoughts any longer, if no further result could be deduced from them than the proof that some one thing would be possible if some other thing were possible; for one such combination of assumptions, however it may lay claim to some momentary interest, would remain but an empty sport of the fancy, which flits across the mind of the reader without leaving any lasting effect behind.

As we proceed in our reflections, we become convinced that we can build up a more solid superstructure by the help of this airy scaffolding, since the consequences which we think we can deduce will enable the reader to grasp the ideas of Space and Time as it were by intuition, whilst, without some such instructions, the description of metaphysical objects is frequently mere *words* for the generality of men. For it is one thing to acknowledge a certain position to be true because we cannot refute the premises from which it is deduced, and another to comprehend it so immediately and completely, that from this time it is in itself intelligible to us, and we consider any thing which contradicts it to be absurd. Thus, for example, he to whom the geometrical proposition, that the angles of a triangle are together equal to two right angles, has been intelligibly demonstrated, must acknowledge the truth of it; but he

has not necessarily comprehended the proposition in its strictest sense. For this, it is requisite that he should get that close insight into the fact, that it belongs to the very existence of a triangle that the angles shall be together equal to two right angles, and that a triangle without this property is as inconceivable and as absurd as a four-cornered circle.

To prepare a way for such intuitive perception, and such immediate knowledge with respect to the nature of Time and Space, and to facilitate its acquisition, is the object of the following reflections. They shall from their plainness *constrain the reader to understand*, and shall force upon him clear notions with respect to matters from which he has often turned away without any consideration.

Truly, the interest which men take in things is very varied, and frequently contradictory: what appears to one as of the

highest importance, appears of no material consequence to another. There is, however, *one* question which must interest every one, even though his leisure and the bent of his mind may not permit him to devote himself earnestly and without intermission to the labor of attempting its solution. This question is the *How* and the *Wherefore* of all things? It is one from which the mind of man cannot be repulsed. When a child, he asks after the Maker of heaven and earth, and is relieved and contented by being directed to an all-wise and perfectly good Almighty Creator. To more mature reflection, this answer is no longer sufficient, because the attempt to deduce the multiplicity of things in the world around us from one single cause, viz. from God, leads us to contradictions which it is the province of Philosophy to unravel. Our mind can indeed only attribute a single effect to a single cause; and when we perceive manifold and

different effects, it becomes at once requisite to our intellect to seek for manifold and various causes. This is a law which is so intolerant of exceptions, that we unwillingly suppose a difference to exist even where our senses cannot discern it. For example, the single ray of the sun gives us light and warmth: it is in our thoughts at once considered double, and analyzed into a lighting and a heating ray, because we are absolutely compelled, even against our inclination, to look out for two causes, a lighting and a warming power, for the two effects, light and heat.

Now, if, in consequence of some certain inherent property of our minds, we are compelled to look for a single First Cause, and a single Creator, for the sum of all the causes and effects which are manifest in the world, which fill it, and which indeed *are* the world, the First Cause must be entirely single and one, because, if we are unwilling

to admit in *It* any difference or variety, we are again as irresistibly driven to the question, What can be the cause of these differences and varieties? It is, however, absurd to inquire after the origin of the First Cause of all things, because the very essence of a First Cause consists in the fact, that the inquiry after some more distant origin is impossible.

To solve and remove this contradiction and absurdity is, as I have already remarked, the province of philosophers. It has frequently been asserted, that they have discovered the solution; but the answer to the question "How?" is still due to the uninitiated: since philosophers allege, that the most intense study of philosophy is requisite to enable us to understand the results at which they arrive.

We are not, however, sufficiently submissive to be put off with such a mysterious answer; and the circumstance itself makes

us suspect, that the philosophers cannot have convinced one another, but that the successor always confutes his predecessor; so that, in the most favorable view, philosophy has taken a step farther each time, but has not yet arrived at the goal.

Now, since all hope, upon the side of philosophers, has been cut off from us, of our ever arriving at the solution of the contradiction from which the intellect in vain struggles to free itself, we will make an attempt to point out, in a generally intelligible manner, a path by which the solution becomes conceivable: — *to point out a path*, I say; that is, I point out the way, and prove it, and render it intelligible that this path, if it is really pervious, *must* lead to the goal. Whether it can be travelled, must be decided by the inquiries, to stimulate and to advance which is the chief end of these lines, and the most earnest wish of the author. The course which our reflections will take,

apparently leads us away from the "Stars and the Earth;" but we shall return to them, and beg the reader to accompany us, step by step, to the conclusions which are the end of our journey.

But, as I have already said, since there is a contradiction between the assumption of a single original Cause, and the world with its manifold changes and phenomena, it follows that there is either no First Cause or no Multiplicity in the world, or, lastly, that both these assumptions are false.

To point out one of these three possible sources of error is, therefore, a step upon the road to truth.

If, for example, it is shown that the various and manifold phenomena in the world are really not various and manifold, but that they are only apparently so, the necessity of discovering for every variety a particular cause no longer exists, and thus a Single Cause becomes sufficient. We will show

that such a view *is* possible, and *how* it is so.

As a single and colorless ray of the sun, when it is seen through a prism, is decomposed into a broad surface with seven different colors, so a world which was really only a single undivisible point might, by our human senses, and by man's method of contemplation and comprehension, be divided, as through a prism with a thousand sides, into the endless multitude of phenomena which are round about us.

All differences and distinctions which we perceive are of two kinds: first, the difference between things which are perceptible to our senses, as the sun, the heavenly bodies, men, beasts, and plants; and, secondly, the difference in matters beyond the cognizance of our senses, as of thoughts and truths. Thus, to mark out the way by which we can lead ourselves to consider the entire world as a single indivisible unit, we

must solve a double problem: — To show, first, that the different thoughts and truths may be looked upon as a single truth; and, secondly, that the parts of the universe and of the history of the world which bear reference to Time and Space can also be viewed together as a single indivisible point.

The first part of the question is that which may be solved most easily, and in the most intelligible way. *There is only one Truth;* and if we think that we can distinguish many, it only depends upon the limited nature of our understanding, which separates and decomposes this unity into many rays.

Let us begin with quite a simple example: Man is mortal, he thinks and he feels. These are three separate and different truths according to our ordinary ideas. But the difference only depends upon the fact, that our mind is not able at once and completely to grasp and understand the idea of Man,

with all its consequences. If this was the case, and if, as soon as we heard the word *Man*, there was present in our minds every thing which is requisite to the realization of the idea, we should immediately entertain the notion of Mortality, of Thought, and of Sensation; and it would not at first occur to us to analyze the idea, and to say "Man is mortal," any more than we should think that we are saying something particular, when we state that a square has four corners, because this property is already understood in the object, and together with it.

A second example will make this more evident. For one who has fully comprehended and knows what a triangle is, it is not requisite that he should be first informed that a triangle has three sides and three angles, that the three angles are together equal to two right angles, and that three lines drawn perpendicularly from the angles to the opposite sides cut one another at the

same point; in short, all that mathematicians have made out concerning the properties of a triangle by a troublesome scientific process; but he understands it all at once. He who has completely comprehended the idea of the globe of our earth understands at once and immediately that it is round, that it is heavy, of what chemical components it is formed, the course it runs, and what creatures it produces. He has included Man, with all his deeds and transactions, his perceptions and ideas, his understanding and the illusions of his senses, as necessary attributes of the earth; and has seen that he could not bring himself to describe or imagine one of these points or truths as any thing special or separate, because he has comprehended all as indivisible and distinct consequences, and components of the idea Earth. He can put down and acknowledge each of these positions as a distinct truth, just as little as we can think that we are

saying something particular when we remark, "A square has four angles."

Lastly, if we enlarge our ideas to the Universe, to the whole Creation, in which all experience, truths, and ideas are included, it follows that, for the most perfect acquaintance with it, only *one* truth and *one* idea exists, viz. the Universe; and that the subdivision of this one universal knowledge is as purely human, and as certainly depends upon the imperfection of human powers of perception, as the necessity of dividing a single ray of the sun into a double power, viz. a lighting and heating ray, because it enlightens and warms us at the same time. For the universe is a great organic whole; and he who has understood and entirely comprehended the idea of an organized being, has also grasped and comprehended all its separate component parts.

In order to point out the way in which we can bring ourselves to consider the

universe as one indivisible unit, we had, as I have above remarked, two questions to solve; 1st, that there is only one truth, or, at least, that all truths may be considered as a single one, and one which is only divisible from the imperfection of human knowledge. This first part of the proposition I think we have proved; in the second part we have to show that the phenomena of the universe which are referrible to Space and Time may be equally well conceived as forming together a single point.

By means of the journey which we have imagined an observer to take from a star of the twelfth magnitude, down to the earth, in an immeasurably short space of time, we have shown that there is a point of observation from which the whole expanse of time, with the occurrences which took place in it, appear to be compressed into a single point. But as, in such a case, the events themselves do not in reality appear to us, but we see

their images on the light in the quickest succession, the problem still remains: — to compress these events into a single point, and to make it intelligible that they themselves, and not only their images, can happen most completely in a single moment of time; and, even more, that a space of time, which we call long or short, is actually and really caused by our human mode of comprehension.

Let us suppose, that from some given time, for example from to-day, the course of the stars and of our earth becomes twice as rapid as before, and that the year passes by in six months, each season in six weeks, and each day in twelve hours; that the period of the life of man is in like manner reduced to one half of its present duration, so that, speaking in general terms, the longest human life, instead of eighty years, lasts for forty, each of which contains as many of the new days of twelve hours as the former

years did, when the days were twenty-four hours long; the drawing of our breath and the stroke of the pulse would proceed with double their usual rapidity, and our new period of life would appear to us of the normal length.

The hands of the clock would no longer make the circuit in one hour and in twelve, but the long hand in thirty minutes, the short one in six hours. The development of plants and animals would take place with double their usual speed; and the wind and the lightning would consume, in their rapid course, but one half of their present time.

With these suppositions, I ask, in what way should we be affected by the change? The answer to this question is, We should be cognizant of no change. We should even consider one who supposed or who attempted to point out that such a change had taken place was mad, or we should look upon him as an enthusiast. We should

have no possible ground to consider that any other condition had existed.

Now, as we can determine the lapse of any period of time only by comparison, or by measuring it with some other period, and as every division of time which we use in our comparison or in our measurements has been lessened by one half its duration, the original proportion would still remain unchanged.

Our forty years would pass as the eighty did; we should perform every thing twice as quickly as before; but as our life, our breath, and movements are proportionately hastened, it would be impossible to measure the increased speed, or even to remark it. As far as we could tell, every thing had remained precisely as it was before, not comparatively, but absolutely, provided we had no standard external to the accelerated course of events in the world by which we could perceive the changes or measure them.

A similar result would follow, if we ima-

gined the course of time reduced to the fourth, instead of to the half, so that the year would consist of three months, the greatest age of man would be reduced to twenty of the present years, and our entire life, with that of all the creatures about us, would be passed in a proportionately shortened period. In this case, we should not only not perceive the change, but we should in reality suffer no change, since we should live to see every thing which we should otherwise have seen; and all the experience and the events of our life, in their duration and with their consequences, would remain unchanged in the relations which they bear to one another.

For the same reasons, if the period and processes of life, and the course of events in the world around us, were accelerated a thousand or a million times, or, in short, if they were infinitely shortened, we should obtain a similar result; and we can in this way imagine the entire course of the history

of the world compressed into a single immeasurably short space of time, without our being able to perceive the change; in fact, without our having undergone any change. For, whether any space of time is longer or shorter is a question which can only be answered, and which can, indeed, only be looked upon as reasonable, if we are able to compare the time to be measured with some other limited period, but not if we compare it to the endless duration which is looked upon as without beginning and without end, which we call "Time."

Hence the proposition, that for the occurrence of any given event a certain lapse of time is requisite, may be altogether rejected. This time which elapses during the occurrence is rather accidental than necessary. and it might as easily be any other period. We shall bring another example to our aid to illustrate the point more clearly: A tune may be performed in different times, either

quicker or slower, without altering thereby in any way its nature. The intervals, the succession of the tones, and the proportionate length of one note to another, remain unchanged; but the impression which it makes upon the hearer will be different, if his entire life has not undergone a corresponding and proportionate change. Now, suppose a musical clock is so contrived as to play any piece in a space of time which may be determined at pleasure: this time may be lengthened or shortened, and it may be so much shortened, that it can become almost infinitely small. It is therefore possible, according to the notion of possibility, which was laid down in the First Part, to cause the longest piece of music to be played in an immeasurably short space of time, and even although our ears would be as little able to distinguish and appreciate the succession of the separate parts, as our eyes are to unravel the over-crowded and rush-

ing stream of the images in a history of four thousand years in a single moment, yet, in one case as in the other, we only require that the human senses should become finer and more perfect, in order to render such comprehension possible.

Thus, as the tune remains unchanged in its nature, even when performed in the shortest space of time, — and it can and must be imagined to exist *in itself*, without reference to any time in which it sounds, — and as such a space was only necessary for the mode of organization of our senses, which is of such a kind that the ear cannot perceive the different tones in any other way than *successively*, so the succession of events can and must be considered independently of the time in which they happen; and, on the other hand, *Time* can as little be imagined to exist alone and in itself as we can imagine "Allegro" and "Adagio" to exist without any tune or melody.

But if it is objected, that, even when the lapse of time has been infinitely shortened, there still remains some period, and that the expansion of time has not been completely set aside, it may be answered *scientifically*, that, in its strictest sense, the idea of any thing infinitely small is the same as the idea of nothing; for, as long as more than nothing remains, we must continue to divide it; and the search after an infinitely small space is only satisfied, when we have arrived at that which is really indivisible, viz. a point which has no parts.

But, by continuing the comparison to a tune which we have commenced, we can refute the objection in a popular way.

It does not require even the shortest space of time to comprehend the idea of the tune, or even to present it to our senses, and communicate it to those of others. This simply follows from the consideration of the page of music upon which it is written. Here

the tune exists entire and altogether, and not in successive parts; and the time which a musician requires to read it is not caused by the nature of the melody, but is a consequence of the impossibility of taking in and understanding the whole contents of the page in an indivisibly short space of time. Thus a looking-glass represents the objects which are placed opposite to it, not one after the other, but altogether and at once, without requiring for the purpose the lapse of any time whatever. From all these considerations, it becomes sufficiently clear that Time is merely a mode and condition by which the human mind, with the assistance of human senses, perceives the occurrence of events; whilst the events themselves, in all their fulness and perfection, may occur in a longer or a shorter time, and thus must be looked upon as independent of time. A thought or an idea is something momentary. He who has such an idea has it entire and

at once. But he who wishes to communicate it to others requires for the purpose a certain time, just as such a space is also necessary for those to whom it is communicated. Hence, time is not necessary for the origination or existence of the idea, but only for its communication and comprehension; and the idea exists as independently of time as, according to the points we have discussed before, the entire history of the world can and must be looked upon as independent of time. *Time is only the rhythm of the world's history.*

Having arrived at this conclusion, it will be useful to recapitulate, as clearly as we can, the course of our reflections.

Of the three ways in which we thought we could solve the contradiction between a Manifold World and a Single Creator, we entered upon that one which denied the existence of the multiplicity in the world, and by which it can be supposed that the world

is really single and indivisible, and that it is by the human mind and its limited mode of comprehension subdivided into a multiplicity of phenomena.

In order to show how such Unity can be imagined, we have first reduced the empire of thought to the single idea of the universe, and then the empire of phenomena appreciable to our senses remained, which is manifold in its nature, because its parts and its events become perceptible to us by being separated and referred to Time and Space. But we have so far set aside the notion of Time, in that we have pointed out that it does not exist *in* and *for itself*, but that it is only a mode by which we observe events, and by which their occurrence comes to our knowledge. We must, in like manner, examine the idea of Space.

As it appeared in our examination into the essence of Time, that the question whether any thing lasted a longer or a shorter time

had any meaning only when the period was compared with some other limited given period of time, but that, in comparison to Endless Time, the question whether a certain space was long or short was nonsense, since every finite thing compared with something infinitely greater appears like nothing; so, in like manner, it will appear with regard to the expansion of Space. The entire created universe, considered with respect to its limits, is a mere point in that which we call endless space, even if we imagine these limits to extend beyond the most distant fixed stars and nebulæ. This proposition, which we have so often laid down and argued from, does not become entirely intelligible to the generality of mankind, until we illustrate it in a way as appreciable to our senses as we did with respect to time. The plan of our illustration is also exactly similar to the former one.

Let us suppose, for example, that, from

the present moment, all the measurements of the universe are reduced to the half of their size, and that all distances are equally shortened, it would be absolutely impossible for us to perceive, or indeed to believe if it was told us, that any change had happened to us, or to the world around; and we might, like Gulliver's Liliputians, fairly consider ourselves perfectly grown men. But if every thing was lessened a million or a billion times, it would be as little noticed by us as when the reduction of all measurements to the half of their size took place; and if our system of fixed stars, with all that it contains, was suddenly contracted to the size of a grain of sand, we should move and exist with the same freedom from restraint, and with the same convenience, in that little world, as we now do in this which seems so large to us. No change would have taken place in the universe, as long as we did not imagine another universe beyond it; and

the question whether any such change had taken place would have as little meaning in reference to space as a similar question had in respect to the duration of time, which we supposed to have been suddenly shortened.

In this way it is shown, that, to our recollection and knowledge, a proportionate change in the whole space of the universe would be completely and altogether unobserved and imperceptible.

But even though in these considerations we have imagined the universe to have been compressed into so small and narrow a compass, yet we have not altogether done away with space, because we can still imagine something more minute than the infinitely small space, viz. an indivisible point. In our reflections concerning an infinitely short period of time, we have already shown that, strictly and scientifically considered, they are one and the same thing. We can, however, show, in an intelligible way, that it is

conceivable, and not at all contrary to reason to assume, that the expanse of Space and the distance and propinquity of various objects do not really exist, but that Space or propinquity is only apparent, and originates from the fact, that, with our circumscribed understanding and the limited powers of our senses, we can contemplate the one indivisible point, the Universe, in no other way than by dividing and stretching it out into *length*, *breadth*, and *height*. These are the only three properties which we need attribute to Space; but they are, of course, indispensably necessary, and without them physical existence cannot be imagined; and length cannot exist without breadth, nor breadth without height; for in those cases the body would have only length and height, or only breadth and length. That which has only two of these dimensions is not a body, but only the boundary of a body, viz. a superficies. In like manner, that which

has only one dimension, viz. length, is no longer a surface, but the edge of a surface, viz. a line. Thus, in order that any physical space can exist, it is of course absolutely necessary that all three dimensions should exist, as, in other words, all three are necessary properties of Space.

But a necessary property of any thing is that without which it is no longer the same, but something else. For example, the necessary properties of a square are, that all four sides should be equal, and all angles right angles. If one side is no longer like another, or if one angle is no longer a right angle, the figure ceases to be a square, and becomes some other kind of quadrilateral figure, and we should not listen to any one who would persuade us that it was still a square. Let us apply this to the idea of Space, or, what is the same thing, to the idea of a body. It is necessary to the existence of any limited body, that it should

have length, breadth, and height, that it should be bounded by surfaces, and that the edges of these surfaces should be formed by lines, and that the ends of the lines should be points. All these properties must exist together, otherwise the body itself does not exist.

Now, if we can imagine evidence which will bring us to the conclusion that in any case a body has not three dimensions, and a surface has not two, and if such evidence is incontrovertible and not to be refuted, it would necessarily follow, that this body and this surface are not a body and a surface, but that some delusion of our senses, or some false conclusions, had induced us to consider them so. The same may be said of a point. A point is that which has no parts. Now, if a point was found in which, nevertheless, there were different parts, it would not be a point; or the difference of the parts would not be a real difference, but only one which would become apparent

from our limited powers of thought and perception. These conclusions are clear and incontrovertible; and, supposing that the reader has completely agreed with us up to this point, we proceed a step further.

There is an optical apparatus, known to all of us under the name of a Magic Lantern. It is constructed in the following manner: A picture, painted upon glass with transparent colors, is thrown upon a lens which has the property of refracting all the rays incident upon its surface, and of concentrating them to a single point, called the focus. Through this point the refracted rays continue their course onwards, and diverge from one another as much as they previously converged: they form, therefore, beyond the focus a cone of rays with the apex at the focus, and which, at any distance from the apex, forms an inverted image of the picture which was originally thrown upon the lens, as can be proved by directing

the cone of rays upon the wall, when the reversed picture is seen, larger in proportion to the distance of the focus from the wall. If the necessary lenses were ground with perfect optical and mathematical accuracy, and if the position of the glasses was also strictly perfect, and the wall completely smooth, upon approaching the magic lantern so near that the focus falls upon the wall, the light would be seen as a single distinct bright point. In this point, the entire surface of the picture is concentrated, and from it the picture spreads out again upon the wall if the apparatus is moved to a greater distance. Now this *Point* contains the many-colored surface of the picture completely, with all the parts which actually compose it, and with the form and color of every single figure; and the whole picture is really and truly in this single point, for here it has been concentrated by the refraction of the rays. We have thus made it readily apparent to our senses that the indi-

visible point contains within it different parts, contiguous to one another according to our usual mode of comprehension; and thus we have come to a direct contradiction of an idea which has generally been considered quite clear and incontrovertible. The solution of the contradiction is found in the proposition of which it is the object of this little work to prove the possibility; viz. that the Universe, or Space, as far as it is within the scope of our senses, does not exist in the expanded and varied forms which we see around us, but that the expansion and the differences only depend upon our human mode of perception, and are caused by it: for, if here, by means of the magic lantern, a surface has become a point, and if the point contains all the various and distinct parts of the surface, we have shown that the differences which appear by the separation or juxtaposition of the component parts do not require Space as absolutely necessary to their existence, but that one single and indi-

visible point can obtain them all. But, if a surface is no longer necessary that we may understand the juxtaposition of bodies, its very existence is disturbed, and a point is advanced to the dignity of a surface, for it contains and embraces the whole contents of a surface; but, when we wish to perceive the contents with human eyes, we must return and expand the point into the surface which it had before included.

Now, since we have in this way shown that a surface can only be considered a means of rendering the juxtaposition and relation of images cognizable to our senses, in other words, that it is a mere *mode* of *observation*, for that which, as far as its essence is concerned, *may* be contained in a single point, and since one of the three dimensions of Space has in this way been brought down from something real to a mere mode of contemplation, we have deprived Space of one of its necessary properties, and it is no longer real and true

Space, but has become a mere condition by which objects are rendered perceptible to us.

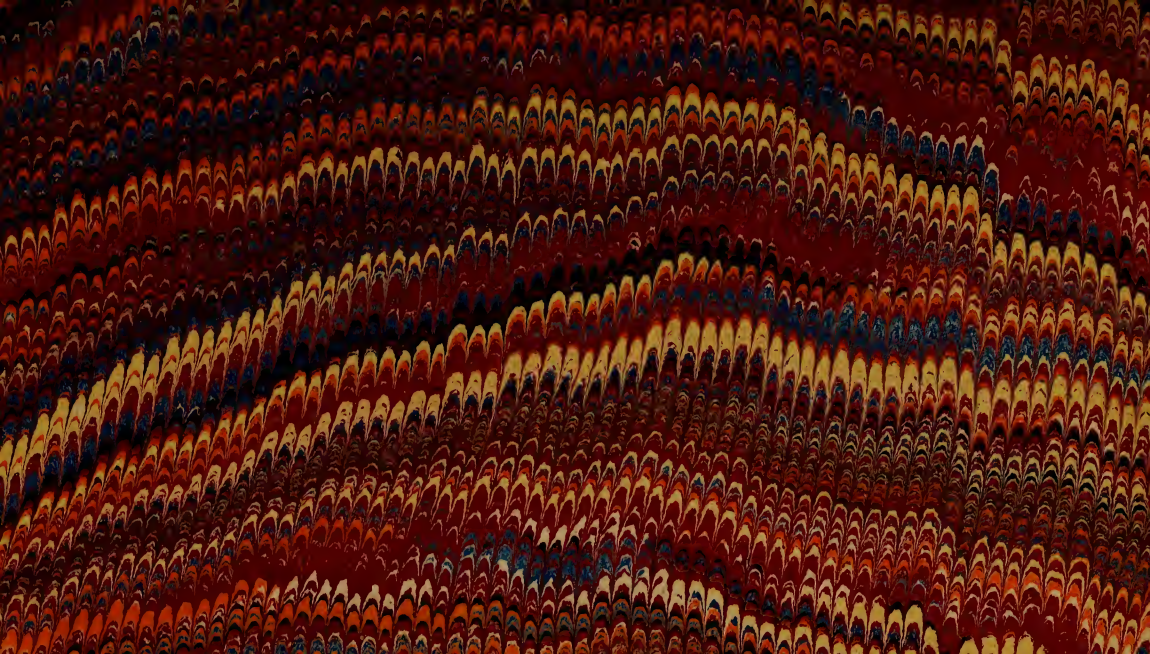
We have thus completed the course of the argument which we proposed; for we have shown that a point of view is *conceivable*, from which the universe no longer requires the expansion of Time and Space in order to exist, and to be intelligible to us; and since our human method of contemplation, inasmuch as it considers this expansion, with all its phenomena, as real and necessary, leads only into inextricable contradictions, so we are compelled to seek for the higher point, and to look upon it as conceivable and possible, even if we are never able actually to realize it, or to look down upon the World from it, in consequence of the limited nature of our powers; for *with* such a point of view, and *by* it alone, can we imagine and completely understand the universe to be the work of a Single Creator.

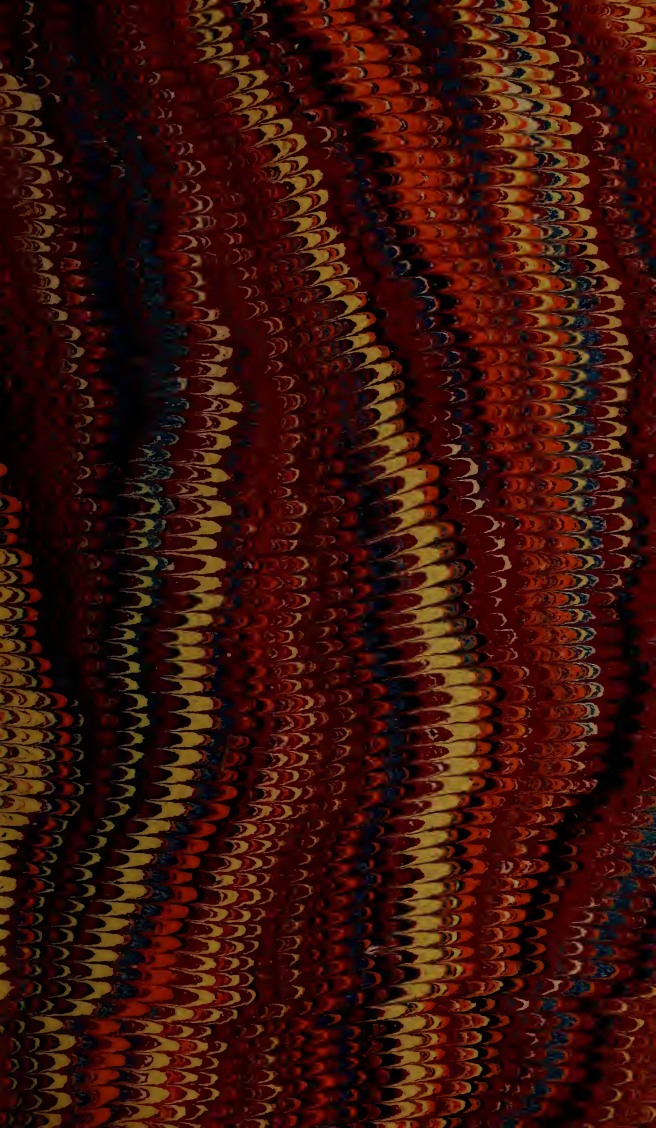
THE END.

ERRATA.

'age 24, 6th line from top, for "endured," read
ued.

'age 70, 8th line from top, for "not only perceive,"
l not only not perceive.





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